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EXAMINER

WALLING, MEAGAN S

ART UNIT

PAPER NUMBER

2863

DATE MAILED: 12/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/893,154

Applicant(s)

LANTZ ET AL.

Examiner

Meagan S Walling

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 36 and 37 is/are allowed.
- 6) ☒ Claim(s) 1-17, 23, 25, 27, 34 and 35 is/are rejected.
- 7) ☒ Claim(s) 18-22, 24, 26 and 28-33 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 2, 6-15 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Fyfe (GB 2,266,771).

Regarding claim 1, Fyfe teaches the claimed electronic thermometer including a probe tip (Fig 2, Ref 10) separated from a probe shaft (Fig 2, Ref 13) by a thermal isolator (Fig 2, Ref 11) disposed therebetween and a probe tip temperature sensor disposed proximate to the probe tip (Fig 2, Ref 20).

Regarding claim 2, Fyfe teaches a proximal temperature sensor wherein the proximal temperature sensor is thermally isolated from the probe tip (Fig 2, Ref 21).

Regarding claim 6, Fyfe teaches a heater element thermally isolated from the probe tip (Fig 2, Ref 22).

Regarding claim 7, Fyfe teaches a temperature control circuit providing controlled power to the heater element (Fig 2, Ref 12).

Regarding claim 8, Fyfe teaches that the temperature control circuit receives input from the at least one temperature sensor and actively controls power to the heater element according to the input using an optimized heater element (see page 4, paragraph 2).

Regarding claim 9, Fyfe teaches that the heater element raises the temperature of the

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probe shaft that is thermally isolated from the tip and impedes heat flow from the probe tip to the probe shaft (see page 4, paragraph 2).

Regarding claim 10, Fyfe teaches an electronic thermometer with a probe shaft having a distal end and a proximate end (Fig 2, Ref 13); a separator (Fig 2, Ref 13) mounted between the distal end and a thermal isolator (Fig 2, Ref 11); wherein the thermal isolator is disposed between and thermally isolates the separator and a probe tip (Fig 2, Ref 10); a heater element in thermal contact with the separator (Fig 2, Ref 22); and a probe tip temperature sensor element in thermal contact with the probe tip (Fig 2, Ref 20).

Regarding claim 11, Fyfe teaches a proximal temperature sensor element in thermal contact with the thermal isolator (Fig 2, Ref 21).

Regarding claim 12, Fyfe teaches a probe tip temperature sensor (Fig 2, Ref 20) mounted against the probe tip (Fig 2, Ref 10) and the proximal temperature sensor (Fig 2, Ref 21) is mounted against the thermal isolator (Fig 2, Ref 11).

Regarding claim 13, Fyfe teaches that at least one of the probe tip temperature sensor and the proximal temperature sensor is a thermistor (page 7, paragraph 8).

Regarding claim 14, Fyfe teaches an active heater control circuit wherein the active heater control circuit causes the heater element to raise the temperature of the probe shaft in response to signals from the probe tip temperature sensor (page 4, paragraph 2).

Regarding claim 15, Fyfe teaches that the active heater control circuit causes the heater element to raise the temperature of the shaft in response to signals from the proximal sensor (page 4, paragraph 2).

Regarding claim 23, Fyfe teaches a base component connected to the probe shaft by a

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flexible cable wherein the flexible cable includes conductors carrying temperature sensor signals and conductors carrying current to the heater element (see page 4, paragraph 2).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 3-5, 16-17, 25, 27, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fyfe in view of Fraden (US 6,129,673).

Regarding claim 27, Fyfe teaches thermally insulating a thermometer probe tip (Fig. 2, Ref. 10) including a temperature sensor (Fig. 2, Ref. 20) from a thermometer probe shaft (Fig. 2, Ref. 13; see page 3, paragraph 10); heating the thermometer probe shaft (see page 3, paragraph 13); reading a temperature signal from the temperature sensor (see page 4, paragraph 5).

Regarding claim 34, Fyfe teaches means for thermally isolating a thermometer probe tip including a temperature sensor element from a thermometer probe shaft (Fig. 2, Ref. 12) and means for applying heat to the thermometer probe shaft (Fig. 2, Ref. 22).

Regarding claim 35, Fyfe teaches means for reading a temperature signal from the temperature sensor element and predicting an equilibrium temperature according to the signal read from the temperature sensor element (see page 4, paragraph 2).

Fyfe teaches everything claimed in claims 3-5, 16-17, 25, 27, 34, and 35 except a temperature prediction component electrically connected to a probe tip temperature sensor

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(current claim 3), the temperature prediction component is electrically connected to a proximal temperature sensor wherein the temperature sensor is thermally isolated from the probe tip (current claim 4), a temperature prediction component wherein the temperature prediction component is operative to calculate a predicted temperature using an optimized temperature prediction algorithm (current claim 5), a temperature prediction component wherein the temperature prediction component calculates a predicted equilibrium temperature according to signals from the probe tip temperature sensor acquired prior to the probe tip temperature sensor reaching thermal equilibrium with a measured subject (current claim 16), a temperature prediction component that causes an output device to provide an indication of the predicted equilibrium temperature prior to the sensor reaching thermal equilibrium with the measured subject (current claim 17), a thermal epoxy is disposed between the probe tip and the separator (current claim 25), predicting an equilibrium temperature according to a prediction algorithm which operates according to the temperature sensor signal (current claim 27), and means for reading a temperature signal from the temperature sensor element and predicting an equilibrium temperature according to the signal read from the temperature sensor element (current claim 34).

Regarding claim 3, Fraden teaches a temperature prediction component electrically connected to a probe tip temperature sensor wherein the probe tip temperature sensor is disposed proximate to the probe tip (column 4, lines 29-33).

Regarding claim 4, Fraden teaches that the temperature prediction component is electrically connected to a proximal temperature sensor (column 4, lines 29-33).

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Regarding claim 5, Fraden teaches a temperature prediction component wherein the temperature prediction component is operative to calculate a predicted temperature using an optimized temperature prediction algorithm (paragraph 3, lines 45-47).

Regarding claim 16, Fraden teaches a temperature prediction component wherein the temperature prediction component calculates a predicted equilibrium temperature according to signals from the probe tip temperature sensor acquired prior to the probe tip temperature sensor reaching thermal equilibrium with a measured subject (column 3, lines 53-55 and column 4, lines 29-33).

Regarding claim 17, Fraden teaches that the prediction component causes an output device to provide an indication of the predicted equilibrium temperature prior to the sensor reaching thermal equilibrium with the measured subject (column 3, lines 53-55).

Regarding claim 25, Fraden teaches using epoxy to achieve hermeticity within the probe (column 7, lines 36-37).

Regarding claim 27, Fraden teaches predicting an equilibrium temperature according to a prediction algorithm that operates according to the temperature sensor signal (column 3, lines 45-47 and 49-51).

Regarding claim 34, Fraden teaches means for reading a temperature signal from the temperature sensor element and predicting an equilibrium temperature according to the signal read from the temperature sensor element (column 3, lines 45-47 and 49-51).

It would have been obvious to one skilled in the art at the time of the invention to combine the teachings of Fyfe with the teachings of Fraden to predict the equilibrium

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temperature. The motivation for doing so would be to more quickly achieve results from a slow response sensor (Fraden; column 3, lines 43-44).

***Allowable Subject Matter***

3. Claims 18-22, 24, 26, and 28-33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for the indication of allowability of claim 18 is the inclusion of the limitation that the temperature prediction component calculates said predicted equilibrium temperature according to a least square fit algorithm. It is this limitation that is in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

The primary reason for the indication of the allowability of claim 19 is the inclusion of the limitation that temperature prediction component calculates said predicted equilibrium temperature according to the following equations:  $T_{sub.b} = T_{sub.p}(R_{sub.1} -$

$C_{sub.1} + R_{sub.2}C_{sub.2} + R_{sub.1}C_{sub.2} + (1-k)(R_{sub.3}C_{sub.3} + R_{sub.2}C_{sub.2} +$

$R_{sub.1}C_{sub.3})) + T_{sub.p}(R_{sub.1}C_{sub.1}R_{sub.2}C_{sub.2} + (1-k)(R_{sub.1}C_{sub.1}R_{sub.2}C_{sub.3} + R_{sub.3}C_{sub.3}R_{sub.1}C_{sub.1} + R_{sub.2}C_{sub.2}R_{sub.3}C_{sub.3} + R_{sub.1}C_{sub.2}R_{sub.3}C_{sub.3})) + T_{sub.p}R_{sub.1}C_{sub.1}R_{sub.2}C_{sub.2}R_{sub.3}C_{sub.3} - b_3(1-k).$

which, when combined with the effects of our heater algorithm, can be modeled as:  $4 T_p(t) - T_p(0) = t - t_0 a(t - t_0) + b$  simplifying to linear form  $5 t - t_0 T_p - T_p(0) = a(t - t_0) + b T$



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final =  $1/a + T_p(0)$ . It is this limitation that is in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

The primary reason for the indication of the allowability of claim 20 is the inclusion of the limitation that the active heater control circuit uses a substantially optimized algorithm programmed in a digital control device to cause substantially instantaneous changes in heater current in response to temperature sensor signals. It is this limitation that is in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

The primary reason for the indication of the allowability of claim 24 is the inclusion of the limitation that the base component houses control components for said heater element and temperature prediction components, said base component further including output devices in communication with said heater control components and said temperature prediction components. It is this limitation that is in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

The primary reason for the indication of the allowability of claim 26 is the inclusion of the limitation that the thermal isolator is made from HPDE--EXXON Escorene HD 6801YN or HPDE--Dow 25455N. It is this limitation that is in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

The primary reason for the indication of the allowability of claim 28 is the inclusion of the limitation of reading a temperature sensor signal from said temperature sensor; computing an optimal heater current control signal according to a heater control algorithm which operates according to said temperature signal; and applying said heater current control signal to a heater

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current control component. It is this limitation that is in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

The primary reason for the indication of the allowability of claim 30 is the inclusion of the limitation of performing a curve fit to fit probe tip temperature data to a first equation:  $T_p(t) - T_p(0) = a(t - t_0) + b$ ; wherein  $T_{sub.p}$  = probe tip temperature; and applying the "a" term in said first equation to a second equation:  $T_{final} = 1/a + T_p(0)$ ; wherein  $T_{sub.final}$  is the predicted final temperature. It is this limitation that is in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

4. Claims 36-37 are allowed.

The following is an examiner's statement of reasons for allowance:

The primary reason for the allowability of claim 36 is the inclusion of the limitation of a first thermistor element mounted to said probe tip and connected to said heater control component and a temperature prediction component; a second thermistor element mounted to said thermal isolator and connected to said heater control component and said temperature prediction component; wherein said heater control component comprises an active heater control circuit that causes said resistor to raise the temperature of said separator in response to signals from said thermistors; and wherein said temperature prediction component computes a predicted equilibrium temperature according to signals from said thermistors, said signals being acquired before thermistors reach equilibrium with a measured subject. It is this limitation that is in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Meagan S Walling whose telephone number is (703) 308-3084. The examiner can normally be reached on Monday through Friday 8:30 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (703) 308-3126. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

msw

  
John Barlow  
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